

DiurnalFromModel v0.8.4

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Introduction

DiurnalFromModel is a smart tool that will generate hourly T and RH grids based on the latest model data stored in your IFP server applied to your forecast max/min T and RH grids. Each grid point's values are calculated independently. This means that each grid point has it's own diurnal curve and time of min and max. Because of a model's ability to resolve non-persistent or non-climatological features, this is especially useful when forecasting a dynamic weather pattern like a frontal passage.

Usage

DiurnalFromModel can create hourly T and RH under any circumstance, but adds the most value over other methodologies during dynamic weather patterns. There are some situations in which persistence or climatology may more accurately describe your desired hourly forecast grids, but DiurnalFromModel should work well in all other situations. DiurnalFromMOS, by Ken Pomeroy, is similar in usage, but takes grid-interpolated MOS bulletins as input, while DiurnalFromModel uses your smart-initiated model data.

Installation

DiurnalFromModel is a stand-alone smart tool and can be installed easily using ifpServerText. Once you have the tool copied to a directory on an lx workstation in AWIPS, do a SITE install on dx4 by running:

```
/awips/GFESuite/bin/ifpServerText -h dx4 -u SITE -s  
-n DiurnalFromModel -f /path/to/tool/DiurnalFromModel_0.8.4.Tool  
-c Tool
```

Configuration

Once you have installed DiurnalFromModel, start the GFE as user SITE and open DiurnalFromModel for editing. There are three items near the top of the tool that need to be configured. These items specify what models will be used to create the final model that the diurnal curve is extracted from. They have been populated with some default values, but feel free to change them.

1. PrimaryModelList – A list of models for the user to choose from that will be used as the primary model to derive the diurnal curve from. These models must begin 'Today', but do not have to run through 'day 7'.
2. SecondaryModelList – A list of models for the user to choose from that, if needed, will be used as a secondary model to fill in after the primary model ends. These models must cover through 'day 7', do not have to start 'Today', but should at least pick up where models specified in PrimaryModelList end.
3. Analysis – This analysis is used to fill in before the primary model begins.

Running the Tool

Before running the tool, your max/min T and/or RH grids must be populated in the Fcst database. With your element of interest, T or RH, selected in the weather element browser, right click the map display and select 'DiurnalFromModel'. You will be presented with a dialog that allows you to select the time range you want to run the tool over and which models to use as your primary and secondary. You can also choose to have the time of min/max and debug grids be displayed as part of the tool's output.

How does it work?

Given a user-specified time range over which to run, the tool calculates an expanded time range over which it must collect model and fcst data to correctly build and interpolate a temporary model used as the basis of DiurnalFromModel. The tool will build this temporary model by piecing together your primary, secondary, and analysis models where needed. The primary model is used in its entirety, the secondary model, if needed, fills in from the end of the primary model to the end of the calculated time range, and, if needed, the analysis is used to fill in from the beginning of the calculated time range to the beginning of the primary model. A cubic interpolation is then performed on this temporary model to create hourly model data. This model appears in the grid manager as diurnalModel. An algorithm is run that extracts the diurnal curve from that model and applies it to your forecast max/min data. DiurnalFromModel will fill in the hourly Fcst grids for your requested element and time range.

Time of Min/Max Grids

If selected in the user dialog, the tool will output grids that show the time of min and max for the element the tool was run on. These values are in units of hours past 00Z for each day. They are calculated from diurnalModel and applied when creating hourly fcst output data.

Debug Grids

If selected in the user dialog, the tool will output many grids that, while meaningless to the average user, may be useful to a developer when debugging problems with the tool:

- maxQueryTr – These are the time ranges over which the tool queries the fcst database for max grids in order to dynamically determine how to build diurnalModel.
- minQueryTr - These are the time ranges over which the tool queries the fcst database for min grids in order to dynamically determine how to build diurnalModel.
- diurnalModelExpandedTr – The time range created after the user supplied time range is expanded to account for timing of needed max/min grids as well as proper cubic interpolation.
- diurnalModelExtremesQueryTr – The time range used to iterate through fcst max/min grids, extracting their time ranges, and using those time ranges to calculate the max/min grids for diurnalModel.
- diurnalModelMax* - The max value of diurnalModel for the specified time range.
- diurnalModelMin* - The min value of diurnalModel for the specified time range.
- scaledModelMax* - Time weighted diurnalModelMax* grids used in the algorithm to calculate the tool's output.
- scaledModelMin* - Time weighted diurnalModelMin* grids used in the algorithm to calculate the tool's output.
- scaledFcstMax* - Time weighted fcst max grids used in the algorithm to calculate the tool's output.
- scaledFcstMin* - Time weighted fcst min grids used in the algorithm to calculate the tool's

output.

- fgrid – Derived from diurnalModel, scaledModelMax*, and scaledModelMin*. This relates the hourly diurnalModel value to diurnalModelMax*/Min* values through scaledModelMax* and scaledModelMin*. The fgrid value is applied to scaledFcstMax* and scaledFcstMin* to derive the final hourly fcst output.

Known Issues

- There are some cases where the DiurnalFromModel algorithm will, at some grid points, create hourly grids that don't quite reach the max/min Fcst value. When this does occur, the difference is small and may be considered acceptable.

Comments, Questions or Suggestions?

Please send email to aaron.sutula@noaa.gov and david.myrick@noaa.gov.

Change Log

- 11/19/07- 0.8
 - Initial release
- 11/27/07 – 0.8.1
 - Fixed a problem with a persistent diurnalModel forecasts causing division by 0 in the creation of fGrids. This was causing NaN values to fail writing of grids to the Fcst database.
- 12/06/07 – 0.8.2
 - Fixed a problem that still allowed the bug 'fixed' in 0.8.1 to happen sometimes.
 - Fixed a bug where the tool wrongly decided to use Fcst persistence before and after the requested time range. This happened when Fcst max/min grids started exactly at 0Z or 12Z and resulted in good Fcst max/min grids being deleted.
 - Fixed a bug where Fcst max/min T and RH grids were queried for using anchor times for T. Added the special case for RH.
- 12/11/07 – 0.8.3
 - Previously, the tool needed the GFE configuration 'missingDataMode' to be set to 'STOP' to function properly. I modified the tool so that the value of 'missingDataMode' no longer matters.
- 5/5/08
 - Updated this document with small improvements and information about debug grids.
- 3/13/09 – 0.8.4
 - Fixed bug where running Diurnal From Model for T and RH back to back would cause diurnalModel to be reused resulting in bad hourly grids. Now diurnalModel gets destroyed when the tool exits.